Water Fluoridation:
What Every Primary Care Physician and Dentist Should Know

What is fluoride?
"Fluoride" is a chemical compound of fluorine, which is a halogen gas. Fluorides occur naturally in most of the earth's water, air, and land.

What is Water Fluoridation?
"Water fluoridation" is the process of adding fluorine, usually in the form of sodium hexafluorosilicate or fluorosilicic acid, to public water supplies.

Why do we fluoridate community drinking water?
During the early part of the twentieth century, doctors and dentists noticed that people living in areas where there was a high concentration of fluoride in the groundwater tended to have fewer cavities than people whose drinking water had low concentrations of fluoride. Rigorous scientific investigation led to the conclusion that an appropriate level of fluorides in water prevents up to 40% of all tooth decay. Many public water systems in the United States started adding fluoride to the water supply during the 1950's, which led to substantially reduced rates of dental decay as early as the 1960's and has continued until the present.

What is "appropriately fluoridated water"?
Appropriately fluoridated water has a fluoride concentration between 0.7 and 1.2 parts per million. In most cases, public water systems add chemicals to increase the fluoride content of the water to appropriate levels. However, in some cases, public water utilities remove excess fluoride from the water.

How do fluorides prevent dental caries?
Fluoride acts in two main ways to prevent dental caries:

1. Fluoride in plaque and saliva reduces demineralization (calcium loss) and enhances remineralization (calcium uptake), so that the teeth have a stronger structure and are more resistant to decay
2. A fluoridated environment has been shown to inhibit acid production by *Streptococcus mutans*, the bacterium whose acidic byproducts are responsible for the majority of tooth decay.

What other sources of fluoride are there besides fluoridated water?
Most processed foods (such as frozen dinners, canned foods, and box meals) are prepared with fluoridated water. Toothpaste contains fluoride as well, and in some parts of the world fluoride compounds have been added to milk or other beverages.

Is bottled water fluoridated?
Bottled water may or may not be fluoridated. You should remind your patients to read the label before buying bottled water products.

Is there a place for fluoride rinsing in communities that have access to fluoridated water?
As always, you should use your clinical judgement when prescribing fluoride rinses. Generally, a person who drinks or cooks with tapwater and who brushes with a

fluoridated toothpaste does not need to use fluoride rinse in addition. A person who drinks or cooks with bottled water exclusively, and who does not use fluoridated toothpaste, may benefit from fluoride rinse.

What precautions should be taken in regard to consumption of fluoridated water and use of fluoride products?

- Children under eight, whose teeth are in developmental stages, may have discolored teeth (fluorosis) as a result of too much fluoride intake. Fluorosis is not dangerous in any way, nor does it affect the function of the teeth. The American Academy of Pediatric Dentistry has published educational materials on the problem of enamel fluorosis. More information is available at: http://www.aapd.org/publications/brochures/fluorosis.asp.
- Dietary fluoride supplements (tablets or drops) should be prescribed, especially in the case of children under 6 years, **only if indicated** depending on the fluoride content in a community's water supply. CDC recommendations regarding dietary supplements can be found at: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5014a1.htm#tab1
- Children under two should not use fluoride toothpaste, as they are incapable of spitting it out properly.
- Excessive fluoride consumption caries the risk of toxic effects such as skeletal fluorosis, in addition to enamel fluorosis.

What resources are available to ascertain the fluoride level in a community's drinking water supply?

This information is readily available on the "My Water's Fluoride" website maintained by the CDC at http://apps.nccd.cdc.gov/MWF/index.asp. By simply clicking on any state in the map on the home page, it is possible to get information on the fluoride content of any public water supplies in the state. You can also call your local water treatment plant. In South Carolina, about 95% of people on public water systems receive fluoridated water; overall, about 70% of the population receives fluoridated water.

How safe is it to use fluoridated water for reconstituting powdered or liquid concentrate infant formula?

Because babies are so small, they need less fluoride than adults. The American Dental Association recommends breastmilk or ready-to-feed formula. For reconstituted formula, parents should use a limited amount of tapwater and mix the formula with a larger amount of fluoride-free bottled water. Excess fluoride ingested by using tapwater to make all formula will not harm the child, but leads to increased risk of enamel fluorosis. For more information on fluoride and infants, see the ADA website at http://www.ada.org/public/topics/fluoride/infantsformula.asp.

Who benefits from fluoride?

Everyone benefits from fluoridated water. It is especially important for children, as their teeth grow and develop, but the decay prevention works the same for everyone. There is some evidence that fluoride may work to strengthen bones as well as teeth, in both children and adults.

Fluoride Resources

The American Dental Association: http://www.ada.org/prof/resources/topics/fluoride.asp

The Centers for Disease Control: http://www.cdc.gov/fluoridation/
South Carolina DHEC: http://www.scdhec.gov/health/mch/oral/index.htm
Surgeon General's Statement: http://www.cdc.gov/fluoridation/fact_sheets/sg04.htm